COMPARISON BETWEEN TWO LABLLED EDTMP RADIOPHARMACEUTICAL WITH ^{153}Sm AND ^{177}Lu

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^{177}Lu and ^{153}Sm are perspective radionuclides in terms of applying in nuclear medicine. High-energy beta particles and the relatively half-life of the radionuclide are used to achieve an effective palliative treatment of bone metastases. The technology-targeted delivery of the radionuclide to the pathological area is used to minimize radiation exposure to healthy organs and tissues. This result is achieved by the rapid delivery of the radiopharmaceutical to the tumor cells. For example, different complexes are used for bones cancer treatment like ^{153}Sm-EDTMP and ^{177}Lu-EDTMP. This complex is concentrated in the skeleton in proportion to osteoblastic activity. Pathological foci, where the accumulation is intense, can be visualized in studies in the gamma camera which allows scintigraphy of the patient and monitor the treatment process. In this work, the effect of the drug carrier EDTMP (i.e. ethylene diamine tetramethylene phosphate) on the ionic form of ^{177}Lu and ^{153}Sm is presented. The absorbed doses in different organs and tissues of ^{177}Lu and ^{153}Sm in ionic form and labelled with EDTMP are determined by IDAC-Dose 2.1 (Internal Dose Assessment by Computer) software. WinAct software is used to calculate cumulative activity[1,2]. ^{177}Lu and ^{153}Sm are lanthanide radionuclide which actively accumulates in the liver and bone when uses in ionic form. In the case of labelling with EDTMP, the distribution and elimination of the drug occur according to the kinetics of the carrier, (i.e. ethylene diamine tetramethylene phosphate). The using of osteotropic (Describing any drug etc. that is attracted to, and targets bone) complex allows creating a large dose in the pathological areas and minimizing damages in healthy organs and tissues. ^{177}Lu and ^{153}Sm labelled with EDTMP are decreasing the liver dose absorption and increasing the bone surface absorption for more effective treatment and minimize side effect. The effective dose per administered activity was estimated to be 0.189 msv/mbq for ^{177}Lu-ionic form, 0.232 mSv/MBq for ^{153}Sm-ionic form and 0.242 mSv/MBq for ^{177}Lu-EDTMP and 0.139 mSv/MBq for^{153}sm-EDTMP. Figure 1 shows the direct effect of EDTMP in absorbed dose distribution for different organs and tissues. Also, even in ionic form the distribution of ^{177}Lu is better than ^{153}Sm more absorbed in bone surface, red bone marrow, and kidney with low absorption in liver.

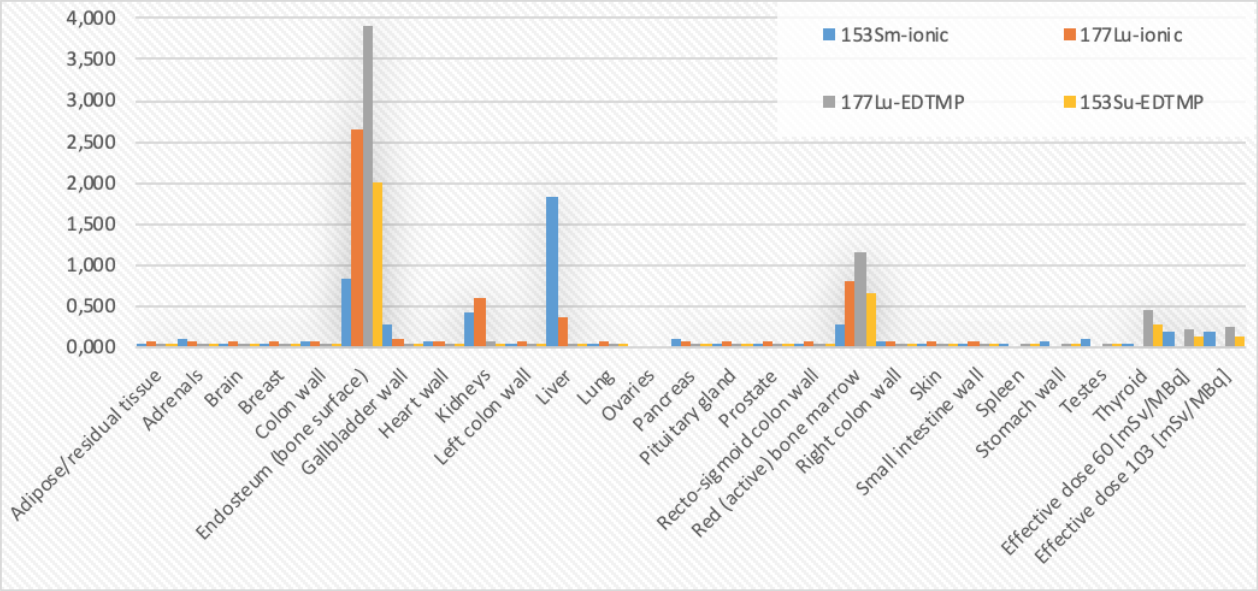

Fig. 1. Absorbed Dose in (mSv/MBq) in different organs and tissues

1. Mostafa. Y.A.M et al., Radiological Physics and Technology, in press (2019).
2. Zhukovsky and Zakaly, *Radiation and Applications*,. in press (2019).

TARGETED DRUG DELIVERY SYSTEM BASED ON MANGANESE-DOPED MESOPOROUS SILICA NANOPOWDER

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Abstract. The purpose of the research was to investigate the potential of using SiO_2-MnO_2 nanopowder, obtained by electron beam evaporation, as a drug delivery system. The evaluation of the sedimentation stability of suspensions was conducted for further in vivo studies. It was established that PEG stabilized suspensions showed the highest stability. Drug loading and release experiments with nanopowders demonstrated a high drug loading capacity of Amoxicillin and Doxorubicin.

Conventional drugs frequently exhibit high toxicity in healthy tissues that leads to reducing the injected dose because of increased risk of side effects, which seriously affects drug effectiveness during the therapeutic process [1]. Targeted drug delivery systems based on nanopowder (NP) can cope with these limitations.

Among the diverse nano-carriers based on Fe, C, TiO_2 and Au nanoparticles one of the most promising system for targeted drug delivery is SiO_2 NP which potentially have high porosity and specific surface area, the possibility of varying pore sizes, good